Bulletin No. 11

LIDGERWOOD HOISTING ENGINES

STANDARD STYLES IN GENERAL USE

LIDGERWOOD MANUFACTURING COMPANY

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Lidgerwood Hoists

IN this Bulletin we illustrate, tabulate and describe a line of steam hoists, swinging engines, swinging gear and some accessories, for Derrick work, Pile Driving and General Contract work.

For these and other purposes we manufacture and list altogether more than 300 styles and sizes of Steam, Electric and Belted Hoists, all of which are shown and described in our General Hoisting Engine Catalogue of 188 pages.

In addition to this large assortment of catalogued hoists ranging in capacity from 1½ to 300 horse-power, we design and build special hoists for any purpose. We have in hand drawings and patterns for a very large number of special Steam and Electric hoists which we have built. We build Steam hoists of any capacity up to 1000 horse-power, with cylinders up to 24 inches diameter, and 30 inches stroke. We build Electric hoists suitable for every class of work done by steam hoists and up to any size or capacity required. The Lidgerwood Manufacturing Company has been building Hoists for more than forty years. The high reputation of Lidgerwood Hoists has been earned by careful attention given to design, material and workmanship throughout this whole time.

Accuracy in form and finish of all Engine parts is secured by a Duplicate Parts System of manufacture. Repair parts accurately fitted can be secured from stock whenever needed and put into service at once.

The Frictions are of the Double-Cone type and are all provided with Patented Cork Inserts. The inserts double the holding power of the frictions, thus relieving operators of a great portion of labor in working the hoists. **The Friction Pins** operate in a patented **Friction Pin Oil Box** where they are always immersed in lubricant. The resultant reduction of friction losses materially increases the capacities of the hoists.

Side Stands are cast separate from the beds and **Ratchet Rings** separate from the Drums. This greatly facilitates and cheapens repairs in case of accidents. All large bedplates are cast in sections and built up. All joints in beds or between beds and side stands are machine faced and secured by fitted bolts in reamed holes and with taper pins where necessary.

The Boilers are made by the Company in their own shops and are of particularly high quality. They are riveted by hydraulic pressure and all seams are caulked inside and outside.

The Drums are turned all over and balanced. They are fitted at each end with bronze bushings to take the wear when overhauling. These bearings are lubricated by oil pipes accessible at all times without removing the rope from the drums.

Nothing is spared to give to Lidgerwood Hoists the highest efficiency, ease of operation and wearing quality.

Every Hoisting Engine is fully tested under steam before shipment. Boiler hoists are tested under their own steam. If this Bulletin does not show the hoist you want, write to us. Tell us what you want a hoist to do. We can supply the proper hoist.

Lidgerwood Manufacturing Company

Standard Contractors' Engine with Cork Insert Frictions

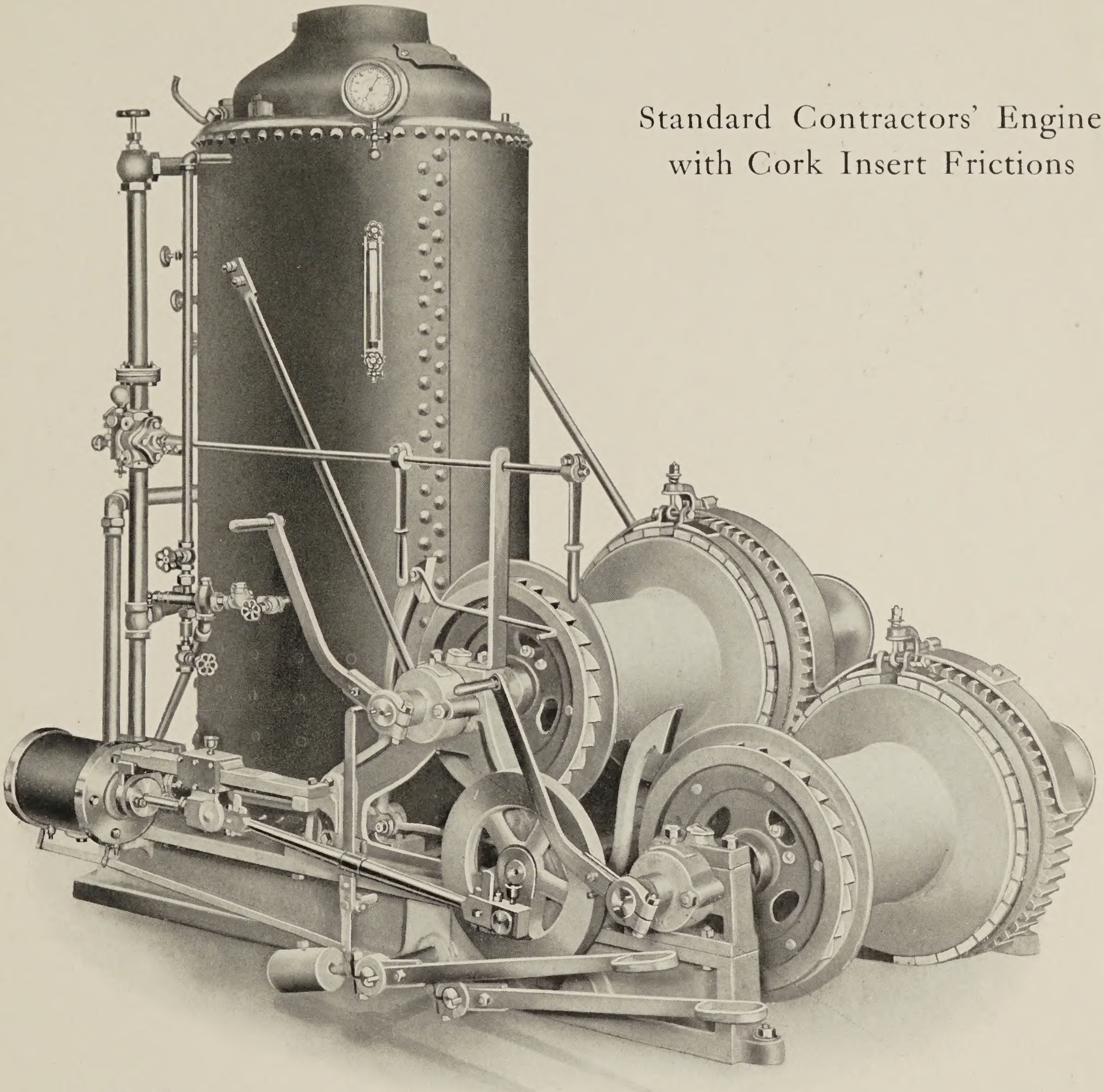


Plate H 10

Table of Sizes, Etc.

Size Number of Engine	Horse-power Usually Rated	Dimensions of Cylinders		Dimensions of Hoisting Drums		Weight Hoisted Single Rope Usual Speed Pounds	Suitable Weight of Pile-Driving Hammer for Quick Work Pounds	Dimensions of Boiler			Dimensions of Bed-plate		Estimated Shipping Weight with Boiler Pounds
		Diam. Inches	Stroke Inches	Diam. Inches	Length Inches			Diam. Inches	Height Inches	Number of 2-inch Tubes	Width Inches	Length Inches	
$70\frac{1}{16}$	6	5	6	10	20	1500	1000	30	72	44	40	72	4900
$70\frac{1}{8}$	8	5	8	12	22	2000	1250	32	75	48	47	80	6850
$70\frac{1}{4}$	12	$6\frac{1}{4}$	8	14	22	3000	1600	36	75	57	50	86	8400
$70\frac{1}{3}$	16	$6\frac{1}{4}$	10	14	22	4000	1800	36	86	57	50	89	9140
$70\frac{3}{8}$	16	$6\frac{1}{4}$	10	14	26	4000	1800	38	81	68	54	89	9725
71	20	7	10	14	26	5000	2500	40	84	80	54	89	10200
72	30	$8\frac{1}{4}$	10	14	27	8000	3000	42	90	88	57	94	12000
$72\frac{1}{4}$	35	9	10	14	33	9000	3500	48	102	115	63	94	14200
73	42	10	10	15	31	10500	4200	50	102	124	67	110	18450
74	50	10	12	16	32	12000	5000	53	102	150	70	117	21400
$74\frac{1}{4}$	60	12	12	18	34	16000	6500	56	120	165	74	130	25950

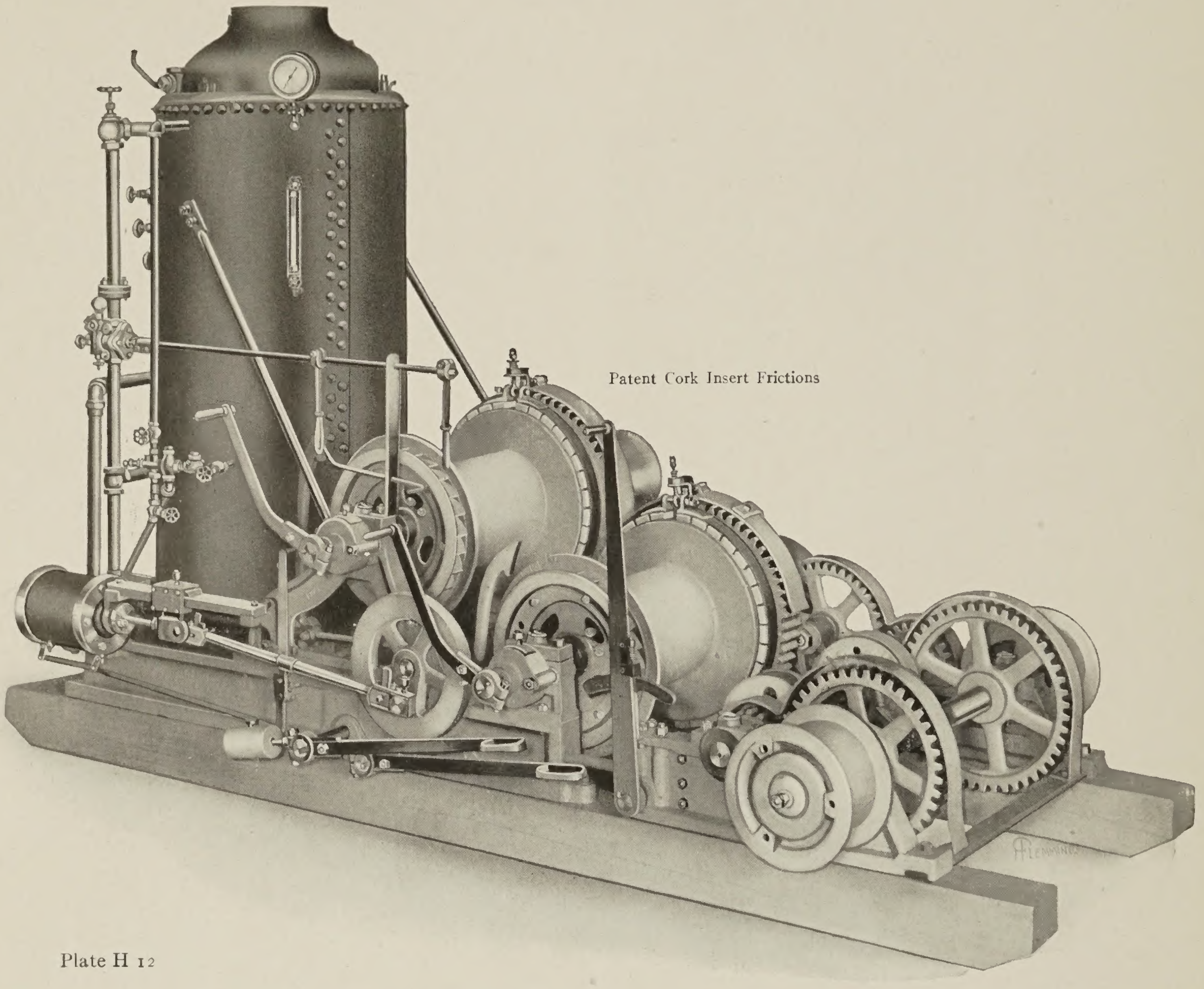


Plate H 12

Boom Swinging Gear with Double Cylinder Double Friction Drum Engine and Boiler

THE engines illustrated by the cut above are the same as those shown on the preceding page, with our patent No. 4 Boom Swinging Gear added. When ordered with the swinging gear these engines are furnished complete, as shown, with a set of heavy skids.

Table of Sizes, Etc.

Size Number of Engine	Horse-power Usually Rated	Dimensions of Cylinders		Dimensions of Hoisting Drums		Weight Hoisted Single Rope Average Speed Pounds	Suitable Weight of Pile-Driving Hammer for Quick Work Pounds	Dimensions of Boiler			Dimensions of Bed-plate		Estimated Shipping Weight with Boiler Pounds
		Diam. Inches	Stroke Inches	Diam. Inches	Length Inches			Diam. Inches	Height Inches	Number of 2-inch Tubes	Width Inches	Length Inches	
370 1/16	6	5	6	10	20	1500	1000	30	72	44	40	119	7200
370⅛	8	5	8	12	22	2000	1250	32	75	48	47	128	9300
370¼	12	6¼	8	14	22	3000	1600	36	75	57	50	134	10850
370⅜	16	6¼	10	14	26	4000	1800	38	81	68	54	136	12200
371	20	7	10	14	26	5000	2500	40	84	80	54	136	12650
372	30	8¼	10	14	27	8000	3000	42	90	88	57	142	14500
372¼	35	9	10	14	33	9000	3500	48	102	115	63	142	16650
373	42	10	10	15	31	10500	4200	50	102	124	67	173	23100
374	50	10	12	16	32	12000	5000	53	102	150	70	180	26100
374¼	60	12	12	18	34	16000	6500	56	120	165	74	194	31000

Engines Nos. 370 1/16 to 372¼ inclusive have No. 4 boom-swinging gear. Nos. 373, 374, and 374¼ have No. 5 boom-swinging gear.

Bridge Erection Engine with Double Drums and Four Independent Winch Heads

Heavy Pattern

Patent Cork Insert Frictions

THE engraving herewith shows a type of engine designed for general construction and bridge erection work, where it is necessary to combine a winch engine with friction drums for ordinary hoisting purposes. The engine has double friction drums, with brakes and ratchets and pawls, and in addition, four independent winch heads, one on each end of the drum shafts. It is made very strong and heavy and has very large drum shafts. These winch heads are bronze bushed and are loose on the shafts, and are operated by jaw clutches, having detent levers with notched quadrants which hold the clutches in place.

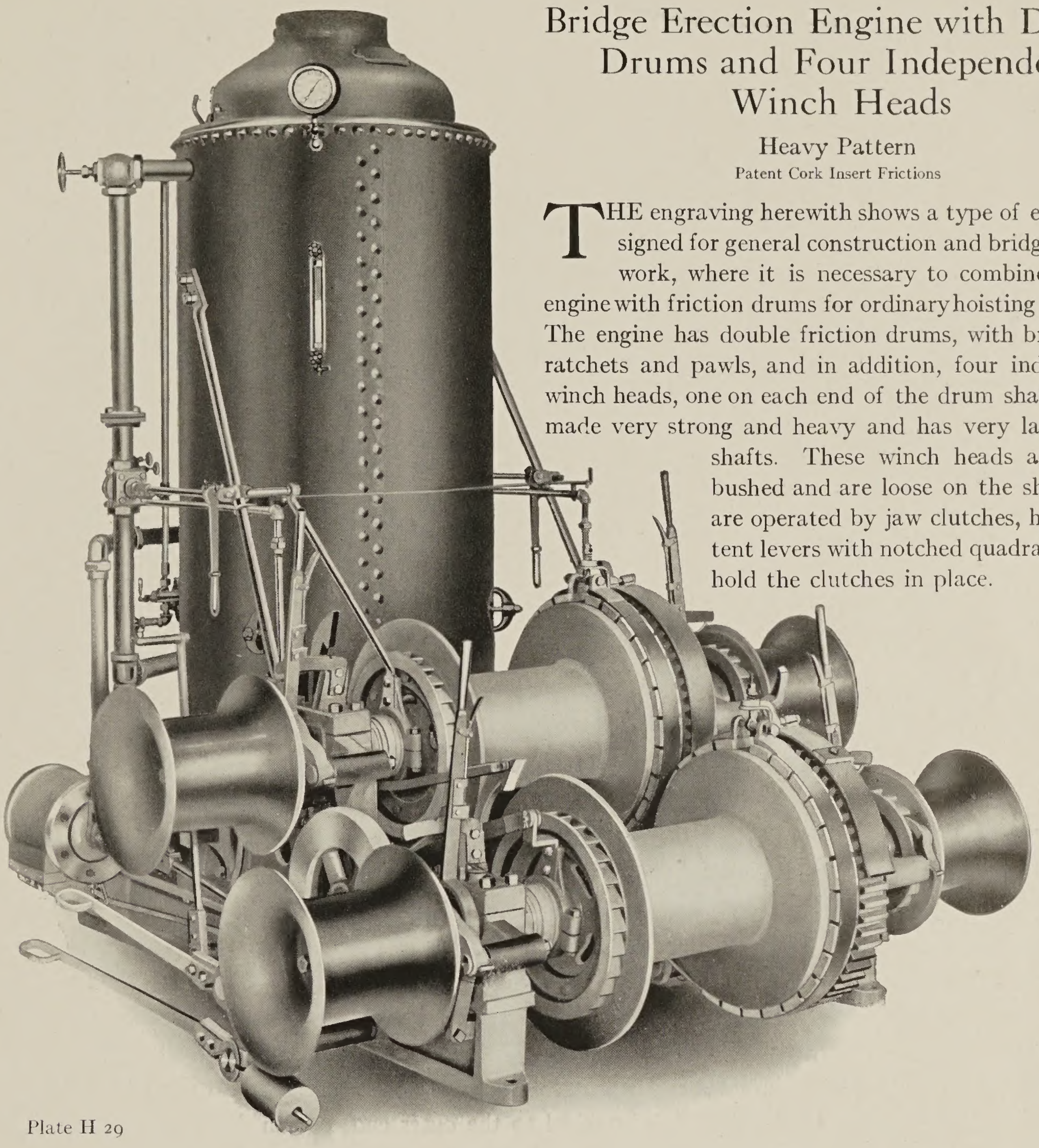


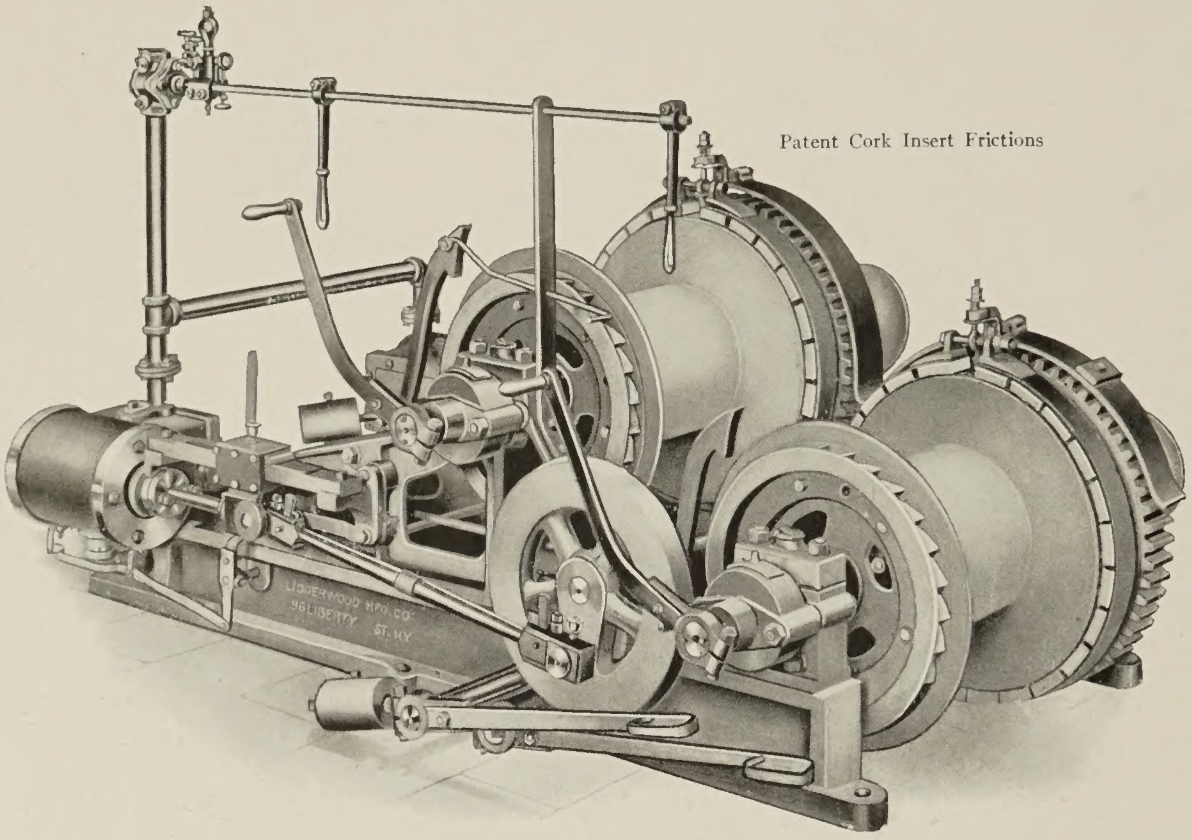
Plate H 29

The frictions are applied to the five smaller sizes by double cams with roller bearings and to the two larger sizes by double friction screws, all operating inside the side frames. The upper or rear drum is operated by a regular lever, as shown, while the forward drum is operated, through suitable connections, by another lever near the boiler.

The winches are of our standard form for bridge erection and are turned off perfectly smooth and polished.

Table of Sizes, Etc.

Size Number of Engine	Horse-power Usually Rated	Dimensions of Cylinders		Dimensions of Hoisting Drums		Weight Hoisted Single Rope Usual Speed Pounds	Suitable Weight of Pile Driving Hammer for Quick Work Pounds	Dimensions of Boiler			Dimensions of Bed-plate		Estimated Shipping Weight with Boiler Complete
		Diameter Inches	Stroke Inches	Diameter Inches	Length Inches			Diameter Inches	Height Inches	Number of 2-inch Tubes	Width Inches	Length Inches	
283	12	6¼	8	14	18	3000	1600	36	75	57	50	86	10100
284	16	6¼	10	14	21	4000	1800	38	81	68	54	89	12700
285	20	7	10	14	21	5000	2500	40	84	80	54	89	13050
286	30	8¼	10	14	23	8000	3000	42	90	88	57	94	14875
286½	35	9	10	14	23	9000	3500	42	96	88	57	94	15450
287	42	10	10	15	27	10500	4200	50	102	124	67	110	21800
288	50	10	12	16	29	12000	5000	53	102	150	70	117	25200
288¼	60	12	12	18	30	16000	6500	56	120	165	74	133	30300



Patent Cork Insert Frictions

Plate H 14

Double Cylinder Double Friction Drum Engine

Specially adapted for General Derrick Work, Dock and Bridge Building, Quarries, Railroads, and Pile Driving.

THIS engine represents our standard double cylinder double drum engine without boiler, which is largely used for all classes of derrick work, and is an extremely useful and popular type of engine. It is much lighter and more compact than the double drum engine with boiler, and is adapted for use in places where steam or air is already supplied. In many instances a number of these engines are used by contractors, or in quarries, where the steam is furnished from one main boiler, with branch pipes running to the various engines.

Each drum is provided with shrouded ratchets and pawls of ample strength to hold securely any load the engine can hoist. A winch head of our regular form is attached to the outer end of each drum shaft, and can be used for hoisting or hauling. The foot brakes add to the safety and convenience of the engine and save wear on the drum frictions occasioned by lowering.

Boom swinging gear is also recommended for use with these engines. (See page 8 and opposite page.)

Table of Sizes, Etc.

Size Number of Engine	Horse-power Usually Rated	Dimensions of Cylinders		Dimensions of Hoisting Drums		Weight Hoisted Single Rope Usual Speed Pounds	Suitable Weight of Pile-Driving Hammer for Quick Work Pounds	Dimensions of Bed-plate		Estimated Shipping Weight Pounds
		Diameter Inches	Stroke Inches	Diameter Inches	Length Inches			Width Inches	Length Inches	
70⅝	8	5	8	12	14	2000	1250	38	76	3925
70¾	12	6¼	8	14	16	3000	1600	39	76	4650
71½	20	7	10	14	18	5000	2500	44	88	5700
72½	30	8¼	10	14	20	8000	3000	47	88	6500
72¾	35	9	10	14	22	9000	3500	51	88	8050
73½	42	10	10	15	23	10500	4200	59	93	11250
74½	50	10	12	16	24	12000	5000	62	107	13100
74¾	60	12	12	18	26	16000	6500	65	110	16800

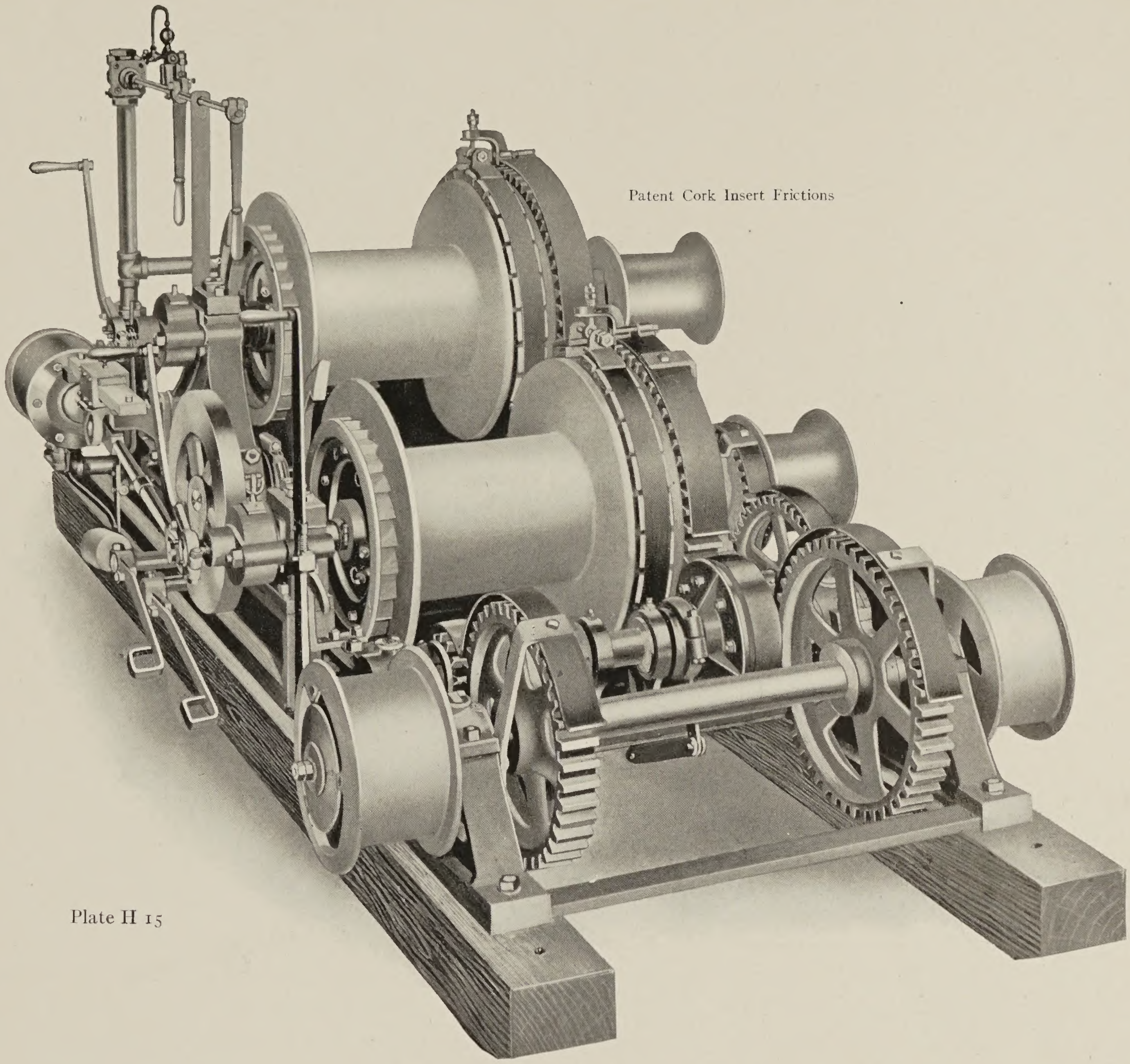


Plate H 15

Double Cylinder Double Friction Drum Engine with Boom Swinging Gear

THE engine shown above is the same as those described on the preceding page, except that it is fitted with the Covell patent boom swinging gear described and illustrated on page 8.

Table of Sizes, Etc.

Size Number of Engine	Horse-power Usually Rated	Dimensions of Cylinders		Dimensions of Hoisting Drums		Weight Hoisted Single Rope Usual Speed Pounds	Dimensions of Bed-plate		Estimated Shipping Weight Pounds
		Diameter Inches	Stroke Inches	Diameter Inches	Length Inches		Width Inches	Length Inches	
370¾	12	6¼	8	14	16	3000	39	124	6000
371½	20	7	10	14	18	5000	44	135	8100
372½	30	8¼	10	14	20	8000	47	135	9050
372¾	35	9	10	14	22	9000	51	135	10600
373½	42	10	10	15	23	10500	59	156	15650
374½	50	10	12	16	24	12000	62	169	17500
374¾	60	12	12	18	26	16000	65	174	21500

Engines Nos. 370¾ to 372½ inclusive have No. 4 boom-swinging gear. Nos. 373½ to 374¾ have No. 5 boom-swinging gear.

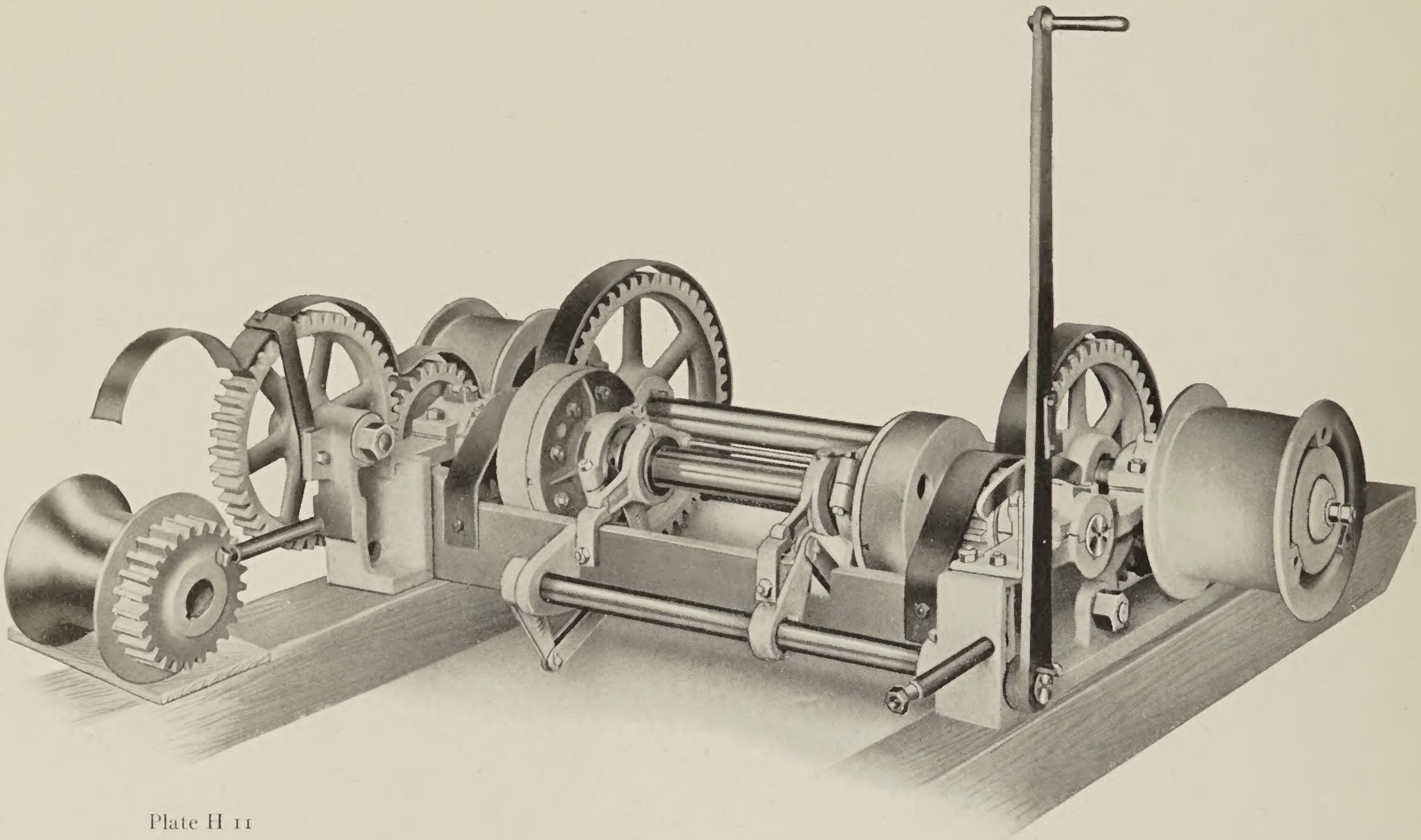


Plate H 11

No. 4 Swinging Gear

(Covell Patent)

THE engraving above shows the No. 4 swinging gear together with the driving pinion cast on the winch head that goes on the front drum of the hoist and it also shows the bolts and spacers used to attach the swinging gear to the front end of the bed-plate of the hoist. This style of swinging gear can be attached to any of the engines new or old, designated in the table below, or any of the equivalent styles of electric hoists. It is made in two sizes. The No. 4 size is used with all engines up to and including those with 9 x 10-inch double cylinders. Above that size the No. 5 gear is used. The No. 5 gear is similar to the No. 4 in all respects except that it is heavier and stronger.

NOTE.—We do not furnish skids with swinging gear when ordered separate from engine.

Table of Sizes, Etc.

Size Number of Swinging Gear	Dimensions of Swinging Drums		Total Gear Ratio From Front Drum Shaft to Swinging Drum Shaft	Engines on which Swinging Gear is used	Estimated Shipping Weight Pounds
	Diameter Inches	Length Inches			
4	12	8¾	3.3 to 1	Narrow Engines, Nos. 70$\frac{1}{16}$, 70¾, 283, 207½	2000
4	12	8¾	3.3 to 1	Regular Engines, Nos. 70⅛, 70¼, 70⅜, 71, 71½, 72, 72¼, 72½, 72¾, 208½, 209½, 209⅝, 212½, 213½, 214½, 215½, 216½, 216⅝, 284, 285, 286,286½	2130
5	16	9	4.5 to 1	Nos. 73, 73½, 74, 74¼, 74½, 74¾, 210½, 211½, 211⅝, 217½, 218½, 218⅝, 287, 288, 288¼	4000

No. 4 swinging gear can be used with engines Nos. 207 to 209¼ and 212 to 216¼, and No. 5 swinging gear with engines Nos. 210, 211, 211¼, 216¼, 217, 218 and 218¼, by adding a guide sheave to lead the rope off the front drum to clear the swinging gear. Guide sheaves will be furnished at an extra cost. (See also swinging engines, pages 9 and 10.)

Engines Nos. 283, 284, 285, 286, 286¼, 287, 288 and 288¼ have the swinging gear applied direct to the lower drum gear instead of to an outside winch head pinion because of their independent winch heads. Their average gear ratio from drive to swinging drum shaft is 2½ to 2.

Three Drum Tandem Engine and Boiler with Foot Brakes, Ratchets and Pawls

For Derricks Operating Grab Buckets

Patent Cork Insert Frictions

PARTICULAR attention is called to the fact that the line of engines illustrated herewith as regularly supplied is furnished with friction and brake levers arranged as shown on the following page, so that all three drums can be operated by one man from a central position. These engines are similar to those shown on the next page, except that they have boilers and the drums are wider. If desired we can furnish to order independent jaw clutch winch heads such as those shown on page 5 in place of the three fixed winch heads shown. For engines of this type with interposed pinion and shaft, see "Table of Sizes, Etc.," on pages 8c and 8d.

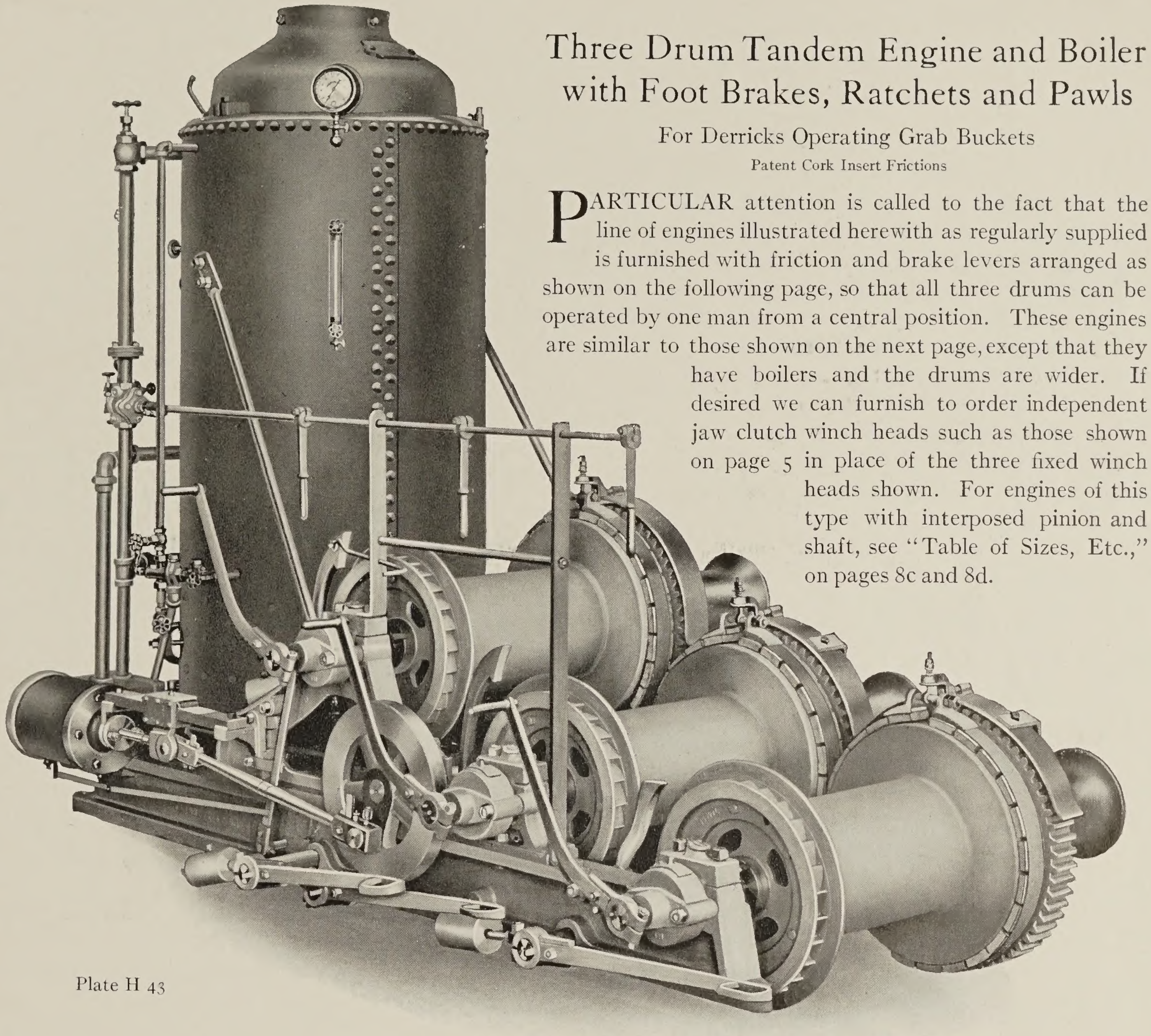


Plate H 43

NOTE.—It is frequently desirable to have the rear drum and shaft stationery with the gear wheel loose, as this greatly reduces the loss by friction when the boom is hanging on the rear drum and the other drums are operating. These engines are made in this way when specially ordered. With this arrangement no winch head can be used on the rear shaft.

Table of Sizes, Etc.

Size Number of Engine	Horse-power Usually Rated	Dimensions of Cylinders		Dimensions of Hoisting Drum		Weight Hoisted Single Rope Average Speed Pounds	For use with Hayward Buckets Weighing With Load Pounds	Dimensions of Boiler		Dimensions of Bed-plate		Estimated Shipping Weight Pounds
		Diameter Inches	Stroke Inches	Diameter Inches	Length Inches			Diameter Inches	Height Inches	Width Inches	Length Inches	
212	8	5	8	12	22	2000	1500	32	75	47	105	8000
213	12	6¼	8	14	22	3000	2250	36	75	50	114	10000
214	16	6¼	10	14	26	4000	3000	38	81	54	117	11500
215	20	7	10	14	26	5000	3750	40	84	54	117	12050
216	30	8¼	10	14	27	8000	6000	42	90	57	126	14300
216¼	35	9	10	14	33	9000	6750	48	102	63	126	16800
217	42	10	10	15	31	10500	9000	50	102	67	146	21850
218	50	10	12	16	32	12000	10000	53	102	70	156	25700
218¼	60	12	12	18	34	16000	12000	56	120	74	175	30750

NOTE.—Engines Nos. 216 and 216¼ have front drums 15½ inches in diameter, but as the front gear wheels are also large in proportion the ROPE SPEED IS THE SAME AS FOR THE OTHER DRUMS

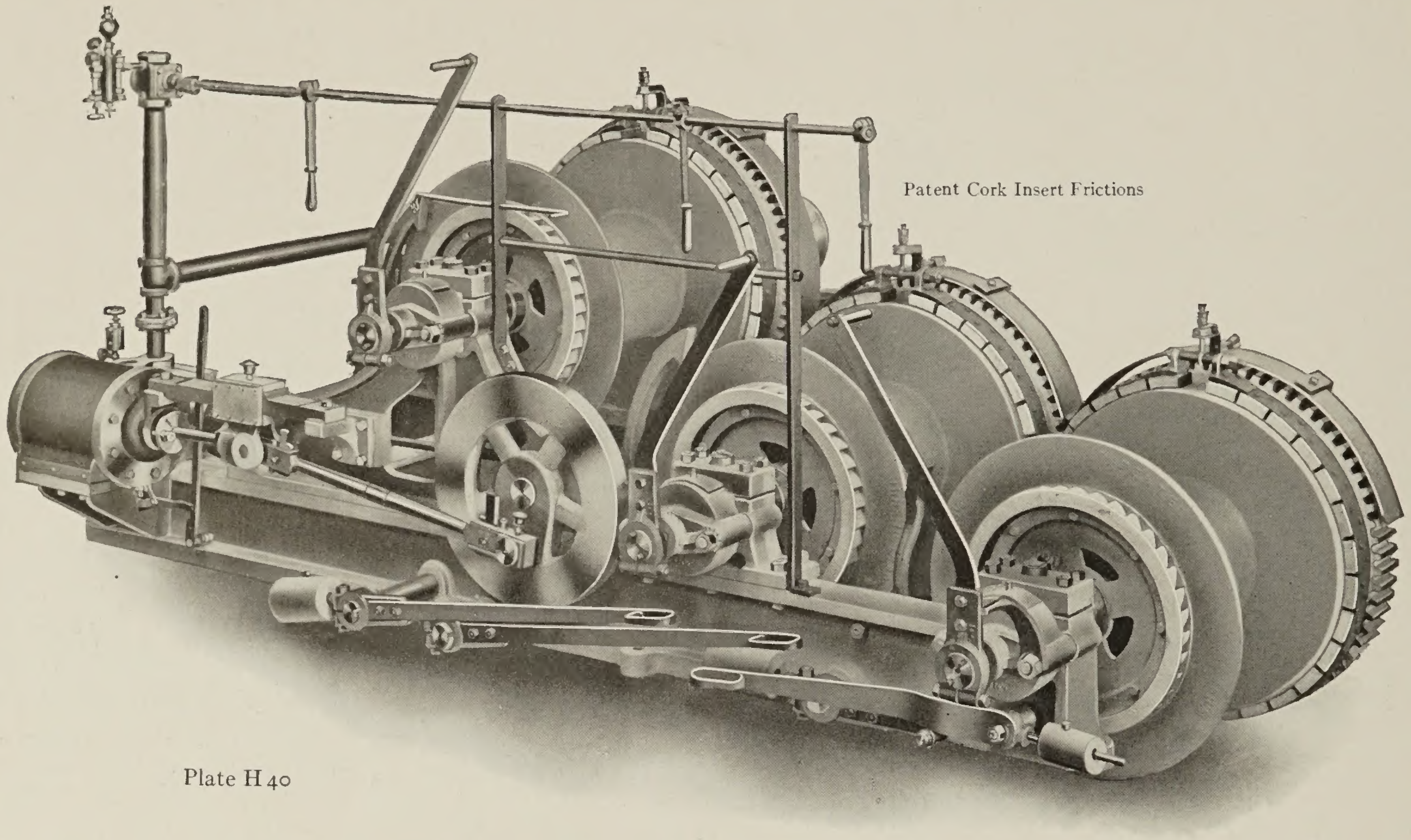


Plate H 40

Three Drum Tandem Engine

For Derricks Operating Clam-shell and Orange-peel Buckets

THE above engraving represents an engine without a boiler having three friction drums arranged in tandem. Particular attention is called to the fact that all the levers are so arranged that all three drums can be operated from a central position by one man. This style of hoist is especially adapted for use with grab buckets. The forward drum is used for raising and lowering the boom, and the other two drums for operating the bucket.

It is also useful for derrick work of various kinds. The drums are of our standard friction type, and have shrouded ratchets with pawls, and foot brakes.

Attention is called to the fact that the forward drum gear meshes directly into the gear wheel of the central drum, and thus causes the drum to revolve in an opposite direction to the other two drums.

Three fixed winch heads are supplied. We can furnish to order special independent jaw clutch winch heads, such as are shown in the engraving on page 5. For three drum tandem engine with boom swinging gear, see the two pages following.

NOTE.—It is frequently desirable to have the rear drum and shaft stationery, with the gear wheel loose, as this greatly reduces the loss by friction when the boom is hanging on this rear drum and the other drums are operating. These engines are made in this way when specially ordered. With this arrangement no winch head can be used on the rear shaft.

Table of Sizes, Etc.

Size Number of Engine	Horse-power Usually Rated	Dimensions of Cylinders		Dimensions of Hoisting Drums		Weight Hoisted Single Rope Average Speed Pounds	Dimensions of Bed-plate		Estimated Shipping Weight Pounds
		Diameter Inches	Stroke Inches	Diameter Inches	Length Inches		Width Inches	Length Inches	
207	12	6¼	8	14	16	2500	39	105	6125
208	20	7	10	14	18	5000	44	117	7325
209	30	8¼	10	14	20	8000	47	121	8550
209¼	35	9	10	14	22	9000	51	121	10400
210	42	10	10	15	23	10500	59	129	14500
211	50	10	12	16	24	12000	62	147	16900
211¼	60	12	12	18	26	16000	65	155	21200

NOTE.—Engines Nos. 209 and 209¼ have front drums 15½ inches in diameter, but as the front gear wheels are also large in proportion the ROPE SPEED IS THE SAME AS FOR THE OTHER DRUMS

Three Drum Tandem Engine with Boiler and Extra Shaft and Pinion

For Derricks Operating Clam-shell or Orange-peel Buckets

Patent Cork Insert Frictions

THE engines listed on this page are the same as those shown on page 8a, except that they have a shaft and pinion interposed between the middle and front drums causing **all three drums to revolve in the same direction.** They are furnished either with or without the boom swinging gear. When sold without the boom swinging gear no skids are included. The levers are arranged so that *all three drums* and the swinging gear can be *operated by one man* from a central position.

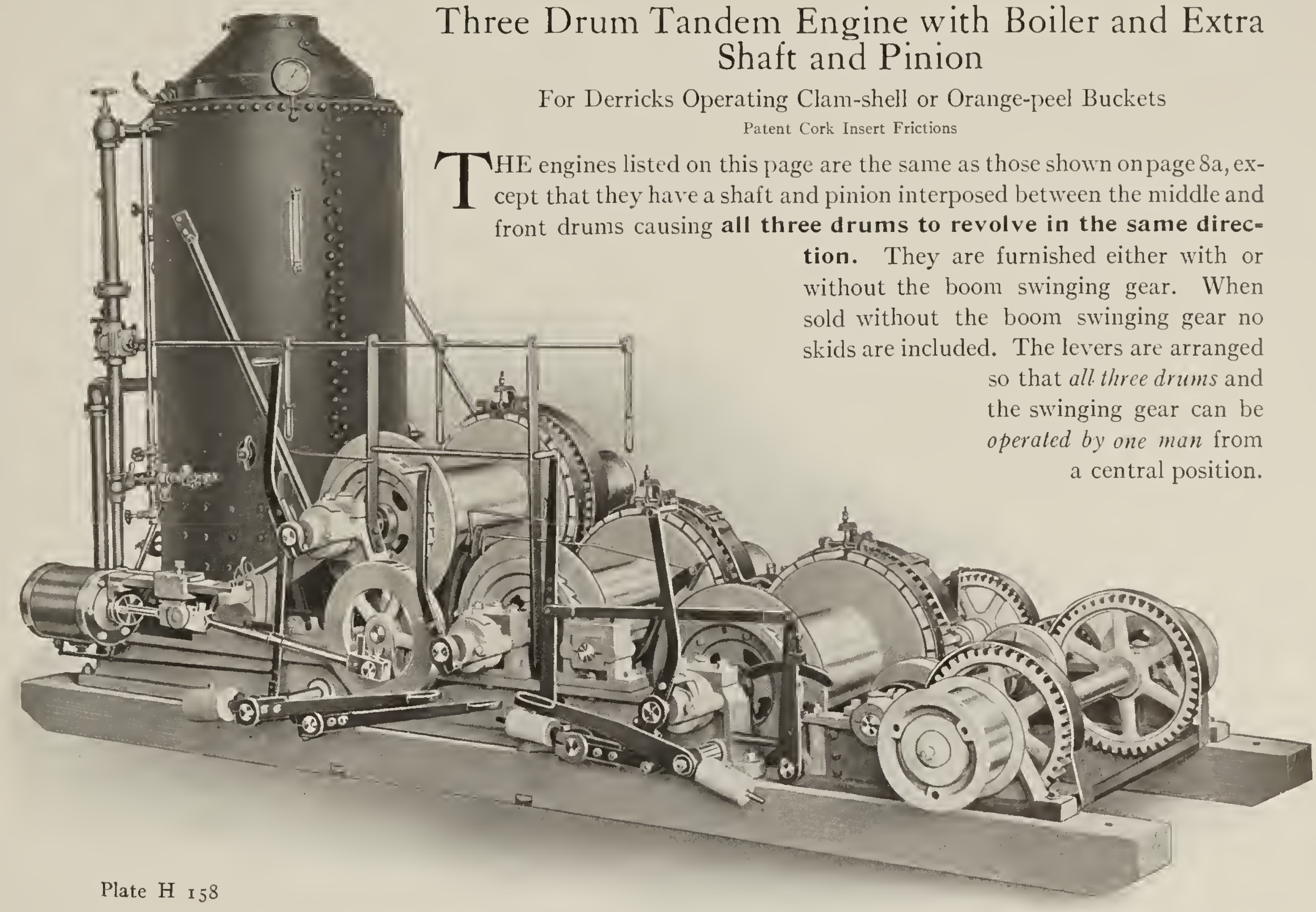


Plate H 158

Table of Sizes, Etc., With Patent Boom Swinging Gear

Size Number of Engine	Horse-power Usually Rated	Dimensions of Cylinders		Dimensions of Drums		Weight Hoisted Single Rope Average Speed Pounds	For use with Hayward Buckets Weighing With Load Pounds	Dimensions of Boiler		Dimensions of Bed-plate		Estimated Shipping Weight Pounds
		Diameter Inches	Stroke Inches	Diameter Inches	Length Inches			Diameter Inches	Height Inches	Width Inches	Length Inches	
212¾	8	5	8	12	22	2000	1500	32	75	47	158	10700
213¾	12	6¼	8	14	22	3000	2250	36	75	50	167	12750
214¾	16	6¼	10	14	26	4000	3000	38	81	54	170	14250
215¾	20	7	10	14	26	5000	3750	40	84	54	170	14850
216¾	30	8¼	10	14	27	8000	6000	42	90	57	178	17125
216⅞	35	9	10	14	33	9000	6750	48	102	63	178	19600
217¾	42	10	10	15	31	10500	9000	50	102	67	216	27700
218¾	50	10	12	16	32	12000	10000	53	102	70	228	31450
218⅞	60	12	12	18	34	16000	12000	56	120	74	248	36750

Engines Nos. 212¾ to 216⅞, inclusive, have No. 4 swinging gear. Engines Nos. 217¾ to 218⅞ have No. 5 swinging gear

Table of Sizes, Etc., Without Boom Swinging Gear

Size Number of Engine	Horse-power Usually Rated	Dimensions of Cylinders		Dimensions of Drums		Weight Hoisted Single Rope Average Speed Pounds	For use with Hayward Buckets Weighing With Load Pounds	Dimensions of Boiler		Dimensions of Bed-plate		Estimated Shipping Weight Pounds
		Diameter Inches	Stroke Inches	Diameter Inches	Length Inches			Diameter Inches	Height Inches	Width Inches	Length Inches	
212½	8	5	8	12	22	2000	1500	32	75	47	111	8225
213½	12	6¼	8	14	22	3000	2250	36	75	50	120	10275
214½	16	6¼	10	14	26	4000	3000	38	81	54	123	11800
215½	20	7	10	14	26	5000	3750	40	84	54	123	12400
216½	30	8¼	10	14	27	8000	6000	42	90	57	131	14700
216⅝	35	9	10	14	33	9000	6750	48	102	63	131	17100
217½	42	10	10	15	31	10500	9000	50	102	67	153	22700
218½	50	10	12	16	32	12000	10000	53	102	70	163	26500
218⅝	60	12	12	18	34	16000	12000	56	120	74	184	31900

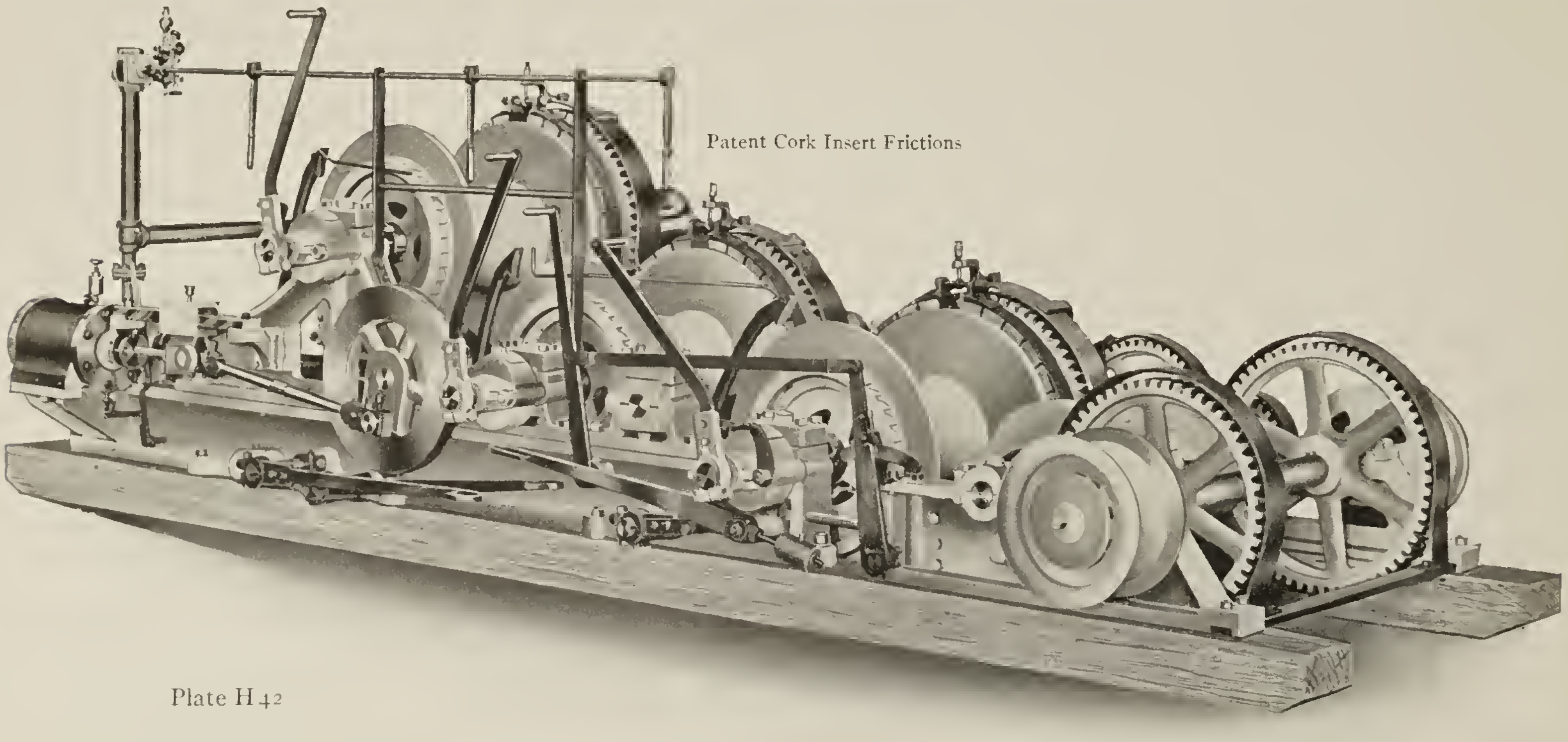


Plate H42

Three Drum Tandem Engine, without Boilers, with Extra Shaft and Pinion

For Derricks Operating Clam-shell and Orange-peel Buckets

THE engines listed on this page are the same as those shown and described on page 8B except that they have a shaft and pinion interposed between the middle and front drums causing **all three drums to revolve in the same direction.**

They are furnished either with or without boom swinging gear. When sold without boom swinging gear no skids are included.

All of the three-drum engines listed can be fitted with the loose gear wheel on the rear drum, or operating levers arranged in a rack, but at extra cost.

Table of Sizes, Etc., with Patent Boom Swinging Gear

Size Number of Engine	Horse-power Usually Rated	Dimensions of Cylinders		Dimensions of Hoisting Drums		Weight Hoisted Single Rope Average Speed Pounds	For Use with Hayward Buckets Weighing with Load Pounds	Dimensions of Bed-plate		Estimated Shipping Weight Pounds
		Diameter Inches	Stroke Inches	Diameter Inches	Length Inches			Width Inches	Length Inches	
207¾	12	6¼	8	14	16	2500	2250	39	158	8900
208¾	20	7	10	14	18	5000	3750	44	169	10150
209¾	30	8¼	10	14	20	8000	6000	47	172	11400
209⅞	35	9	10	14	22	9000	6750	51	173	13300
210¾	42	10	10	15	23	10500	9000	59	199	20100
211¾	50	10	12	16	24	12000	10000	62	218	22600
211⅞	60	12	12	18	26	16000	12000	65	228	27000

Engine Nos. 207¾ to 209¾, inclusive, have No. 4 boom swinging gear. Nos. 210¾ to 211⅞ have No. 5 boom swinging gear

Table of Sizes, Etc., without Boom Swinging Gear

Size Number of Engine	Horse-power Usually Rated	Dimensions of Cylinders		Dimensions of Hoisting Drums		Weight Hoisted Single Rope Average Speed Pounds	Dimensions of Bed-plate		Estimated Shipping Weight Pounds
		Diameter Inches	Stroke Inches	Diameter Inches	Length Inches		Width Inches	Length Inches	
207½	12	6¼	8	14	16	2500	39	111	6425
208½	20	7	10	14	18	5000	44	123	7675
209½	30	8¼	10	14	20	8000	47	125	8900
209⅝	35	9	10	14	22	9000	51	126	10800
210½	42	10	10	15	23	10500	59	136	15350
211½	50	10	12	16	24	12000	62	153	17700
211⅝	60	12	12	18	26	16000	65	164	22150

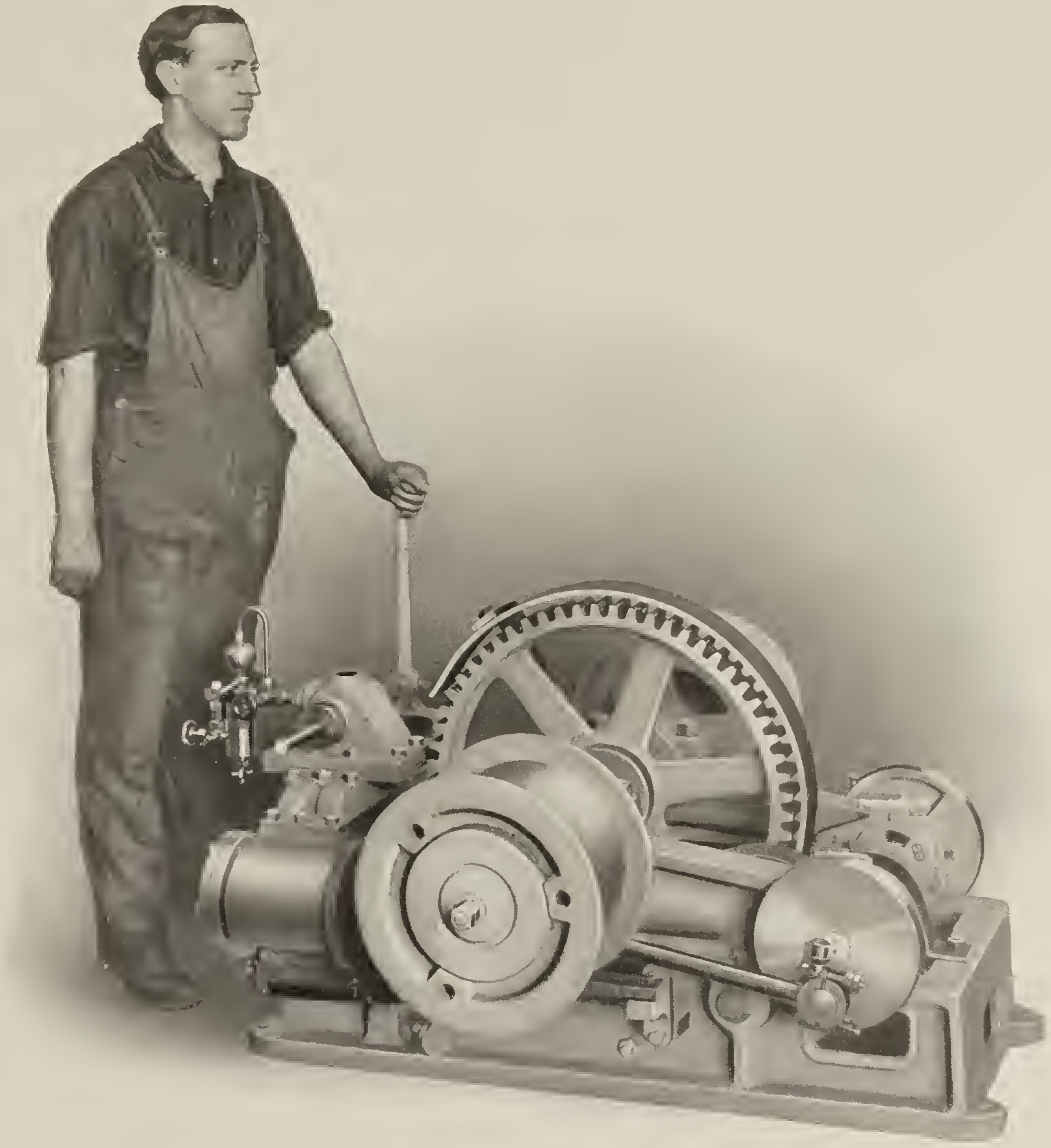


Plate H 156

New Style Swinging Engine with Steam Reversing Valve

FOR derrick, dredge and lighter work independent swinging engines are often desirable. We have designed engines of the style shown above to meet a demand for swinging engines that are simple, light and portable, but extremely strong. They are entirely controlled by a single hand lever acting upon a steam reversing valve. With the lever in the central position the steam is cut off and the engine is at rest. By throwing the lever backward or forward the drums are revolved in either direction. The drum speed varies with the distance the lever is moved.

These engines have double cylinders with a novel and effective form of piston valves.

The drums are finished by turning. One drum is keyed to the shaft and the other is attached by a clutch and may be easily adjusted to take up slack in the ropes. The form of the drums and the method of adjusting the clutch is the same as on our No. 4 swinging gear described on page 8. The drumshafts are made especially heavy. The hoists are compound geared, the first reduction gear having cut teeth. The pinions of the first reduction gear are of steel and the gear wheels of cast iron. The second reduction gear is of cast iron with the pinion shrouded. All gears are protected by heavy guard bands. These engines are made regularly in the two sizes listed below. Larger engines designed along the same lines can be furnished if required.

Table of Sizes, Etc.

Size Number of Engine	Horse-power Usually Rated	Dimensions of Cylinders		Dimensions of Swinging Drums		Rope Pull One Drum (100 Pounds Steam Pressure) Pounds	Dimensions of Bed Plate		Dimensions Over All			Estimated Shipping Weight Pounds
		Diameter Inches	Stroke Inches	Diameter Inches	Length Inches		Width Inches	Length Inches	Width Inches	Length Inches	Height Inches	
154¼	1	3	4	7	6	1000	13½	36	34½	40½	33½	650
154½	6	5	6	12	8¾	4000	19	49	47½	51½	36	1660

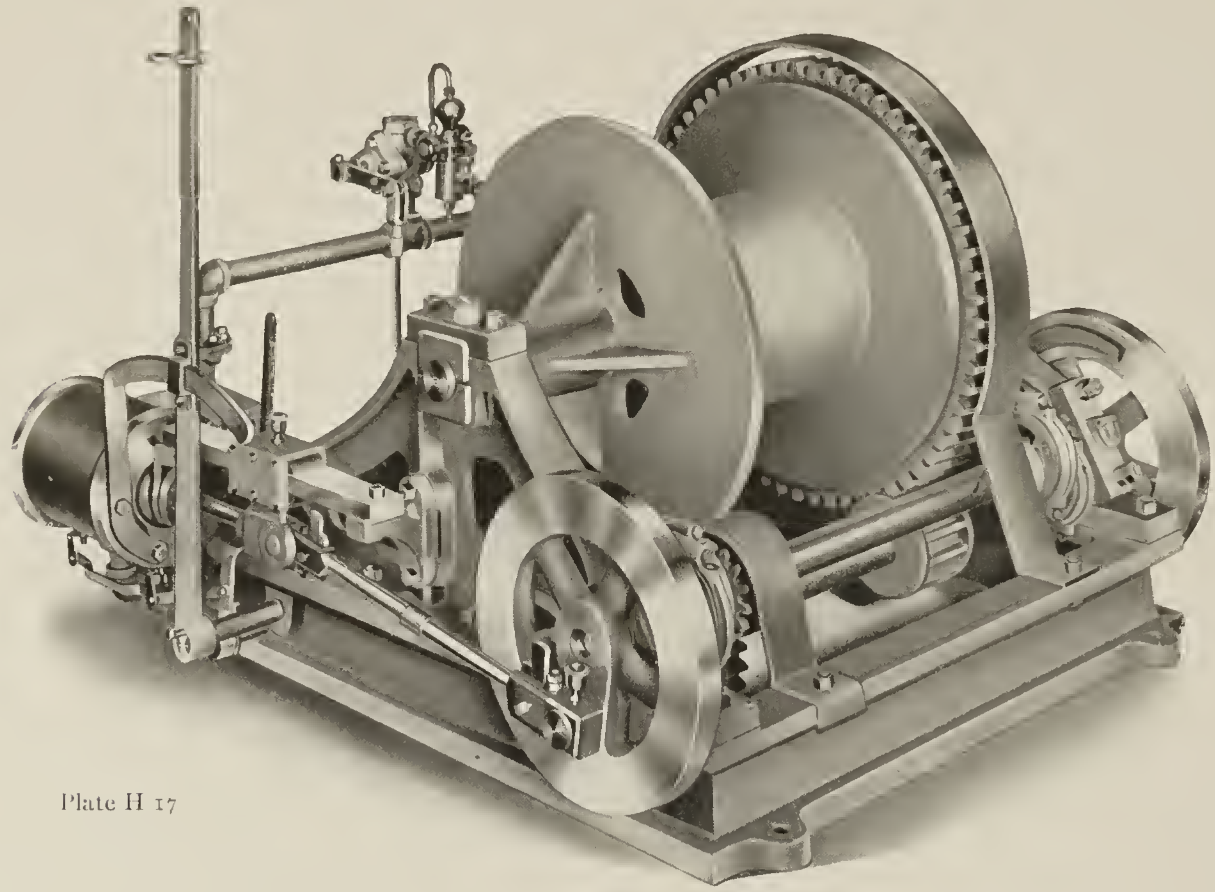


Plate H 17

Swinging Engine with Double Cylinders, Reversible Link Motion and Compound Gear

Adapted for Dredges, Floating Derricks, Etc.

THIS engine is designed for swinging booms on dredges, barges, etc., and for derricks generally. It is of our regular reversible link motion type, with improved throttle valve connections, and is handled by one lever. It is simple and compact in construction and is made especially strong to stand the heavy strains due to dredge work. The shafts are all of steel and of extra size, and the drum is cast with a sleeve to bring the strain close to the bearing, thus preventing the springing due to a sudden pull or strain. The gearing is compounded to reduce the speed and increase the power and is also especially strong. The crank-shaft pinion and intermediary gear wheel have cut teeth.

The reversing lever is arranged for a connection so as to be handled at a distance from the engine and is connected with the throttle valve so that the operator has entire control of the engine with one lever.

NOTE.—For certain cases it has been found desirable to use double friction drum engines of various types for heavy boom swinging. These we build to order.

Table of Sizes, Etc.

Size Number of Engine	Horse-power Usually Rated	Dimensions of Cylinders		Dimensions of Hoisting Drum		Hauling Capacity Single Line Pounds	Dimensions of Bed-plate		Proportion of Compound Gearing	Estimated Shipping Weight Pounds
		Diameter Inches	Stroke Inches	Diameter Inches	Length Inches		Width Inches	Length Inches		
154	6	5	6	14	14	3000	38	48	19 to 1	2175
155	12	6¼	8	14	18	5000	46	60	10½ to 1	3325
156	30	8¼	10	20	26	8000	60	74	12½ to 1	6500

Double Cylinder Friction Drum Engine with Boiler

For Pile Driving, Railroads, Contractors,
Quarries, Docks, Coal Yards and
General Hoisting

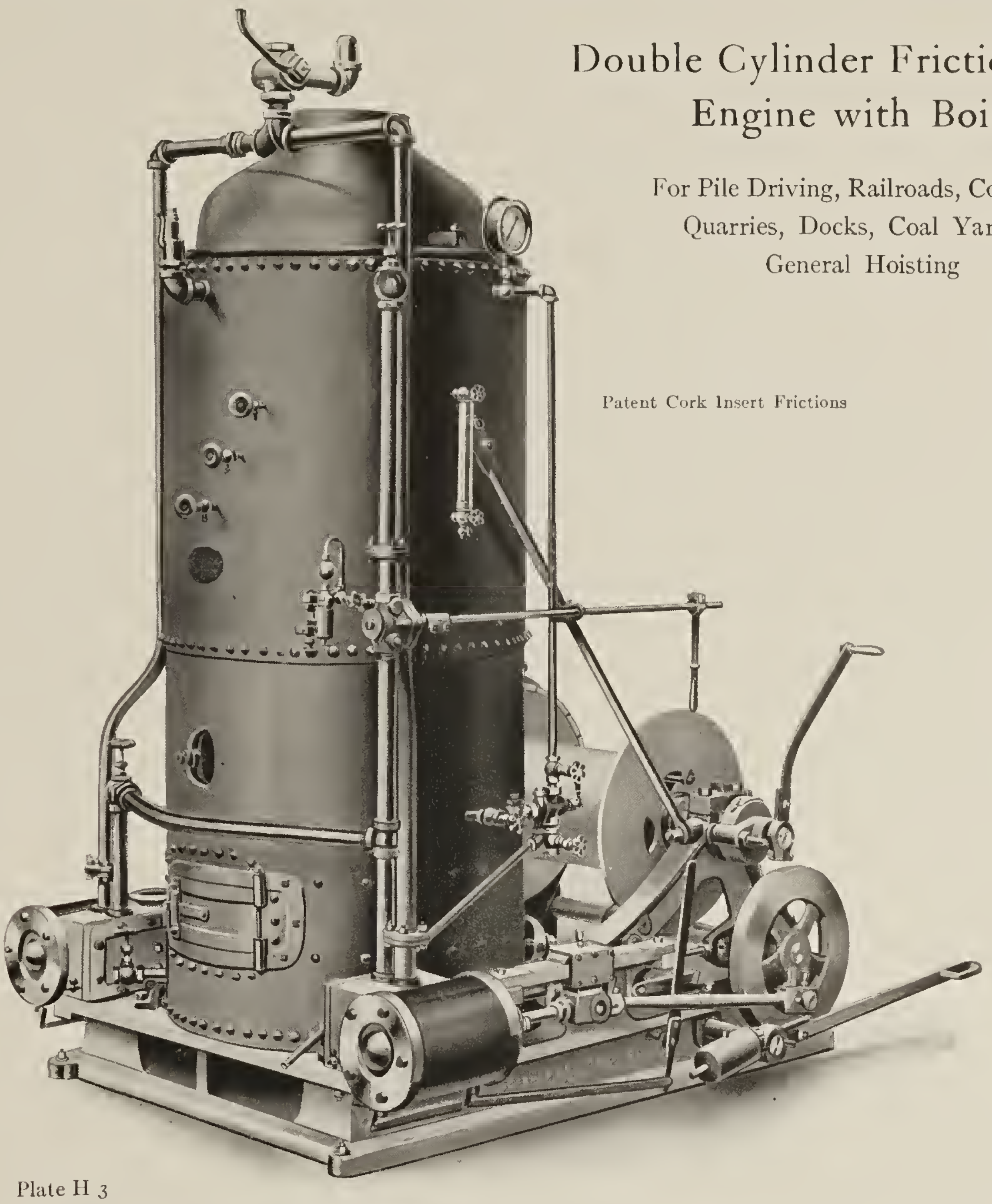


Plate H 3

We also build **Single Cylinder Engines** of this type with cylinders in sizes from 5 x 8 to 10 x 12 inches, rated at 4 to 25 horse-power. These Engines are Nos. 1 to 6, inclusive. They are useful for operating builders' platform hoists, pile driving and many other purposes and have the advantage of being well adapted for operating saws, pumps, rock crushers and such machinery, as they carry a band fly-wheel on one end of the crank shaft and this is turned smooth and slightly crowned to receive a belt.

Table of Sizes, Etc.

Size Number of Engine	Horse-power Usually Rated	Dimensions of Cylinders		Weight Hoisted Single Rope Usual Speed Pounds	Suitable Weight of Pile Driving Hammer for Quick Work Pounds	Dimensions of Hoisting Drum			Dimensions of Bed-plate		Dimensions of Boiler			Estimated Shipping Weight Pounds
		Diam. Inches	Stroke Inches			Diam. Inches	Length Inches	Flanges Diam. Inches	Width Inches	Length Inches	Diam. Inches	Height Inches	Number of 2-inch Tubes	
6½	6	5	6	1500	1000	10	20	22	40	57	30	72	44	4175
7	8	5	8	2000	1250	12	22	24	47	67	32	75	48	5350
8	12	6¼	8	3000	1600	14	22	25	50	71	36	75	57	6350
8½	16	6¼	10	4000	1800	14	26	25	54	75	38	81	68	7800
9	20	7	10	5000	2500	14	26	25	54	75	40	84	80	8250
10	30	8¼	10	8000	3000	14	27	29	57	79	42	90	88	9700
10¼	35	9	10	9000	3500	14	33	29	63	79	48	102	115	11925
11	42	10	10	10500	4200	15	31	33	67	92	50	102	124	15200
12	50	10	12	12000	5000	16	32	36	70	97	53	102	150	18125
12¼	60	12	12	16000	6500	18	34	36	74	109	56	120	165	21400

Reversible link motion and friction drum engines combined made to order. The drums are thereby shortened about three inches.

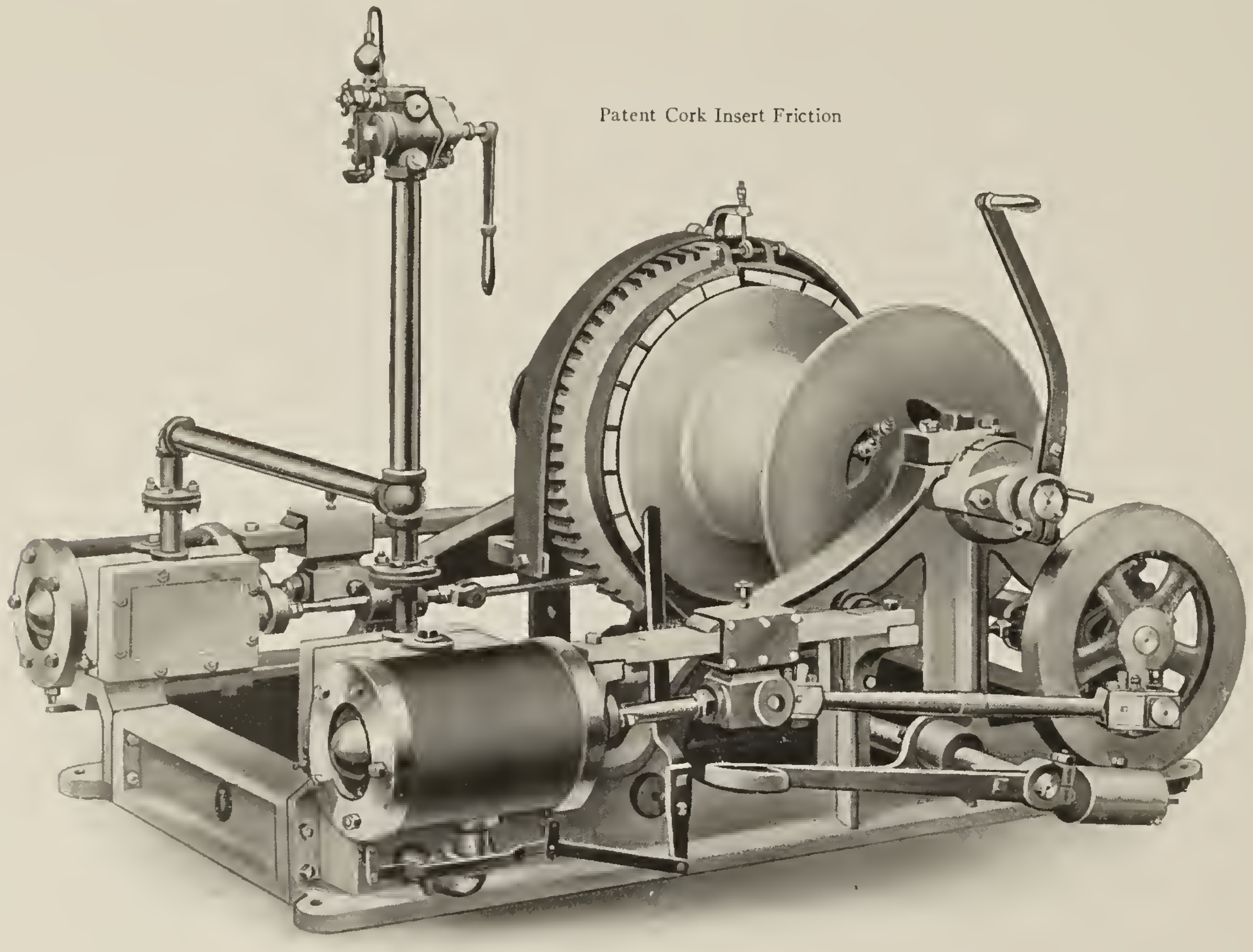


Plate II 7

Double Cylinder Friction Drum Engine

THESE engines are of a most useful type and are largely used for general hoisting purposes where steam or compressed air is available.

They are well adapted for use on docks. They can be either fixed at definite points or mounted on dock wheels. In the latter case, being portable, they can be concentrated at any place and unload a vessel very quickly, and thus a few engines can be made to cover a large dock with efficiency and economy. They are also useful on steamers for handling freight and on sailing vessels for handling cargo, sails, anchor, etc.

For **Small Mines** many are in use for depths of 50 to 200 feet or more, the drums being usually lagged, increasing the diameter about six inches.

The foot brakes furnished add to safety in handling the load and save wear on the drum friction.

A winch head is fixed to the outer end of the drum shaft and is useful in many ways.

We build **Single Cylinder Engines** in this style in sizes from 5 x 6 to 10 x 12-inch cylinders, rated at 3 to 25 horse-power. They are Nos. 25 to 31, inclusive.

Table of Sizes, Etc.

Size Number of Engine	Horse-power Usually Rated	Dimensions of Cylinders		Weight Hoisted Single Rope Usual Speed Pounds	Dimensions of Hoisting Drum		Dimensions of Bed-plate		Estimated Shipping Weight Pounds
		Diameter Inches	Stroke Inches		Diameter Inches	Length Inches	Width Inches	Length Inches	
32	6	5	6	1500	10	14	34	44	1800
33	8	5	8	2000	12	14	36	57	2475
34	12	6¼	8	3000	14	16	39	59	2900
35	20	7	10	5000	14	18	44	70	3575
35¾	30	8¼	10	7000	14	20	47	72	4550
36	30	8¼	10	8000	16	26	54	72	5525
36¼	35	9	10	9000	16	26	54	73	6000
37	42	10	10	10500	16	24	59	75	8100
38	50	10	12	12000	16	24	62	88	9500
38¼	60	12	12	16000	18	26	65	89	12450

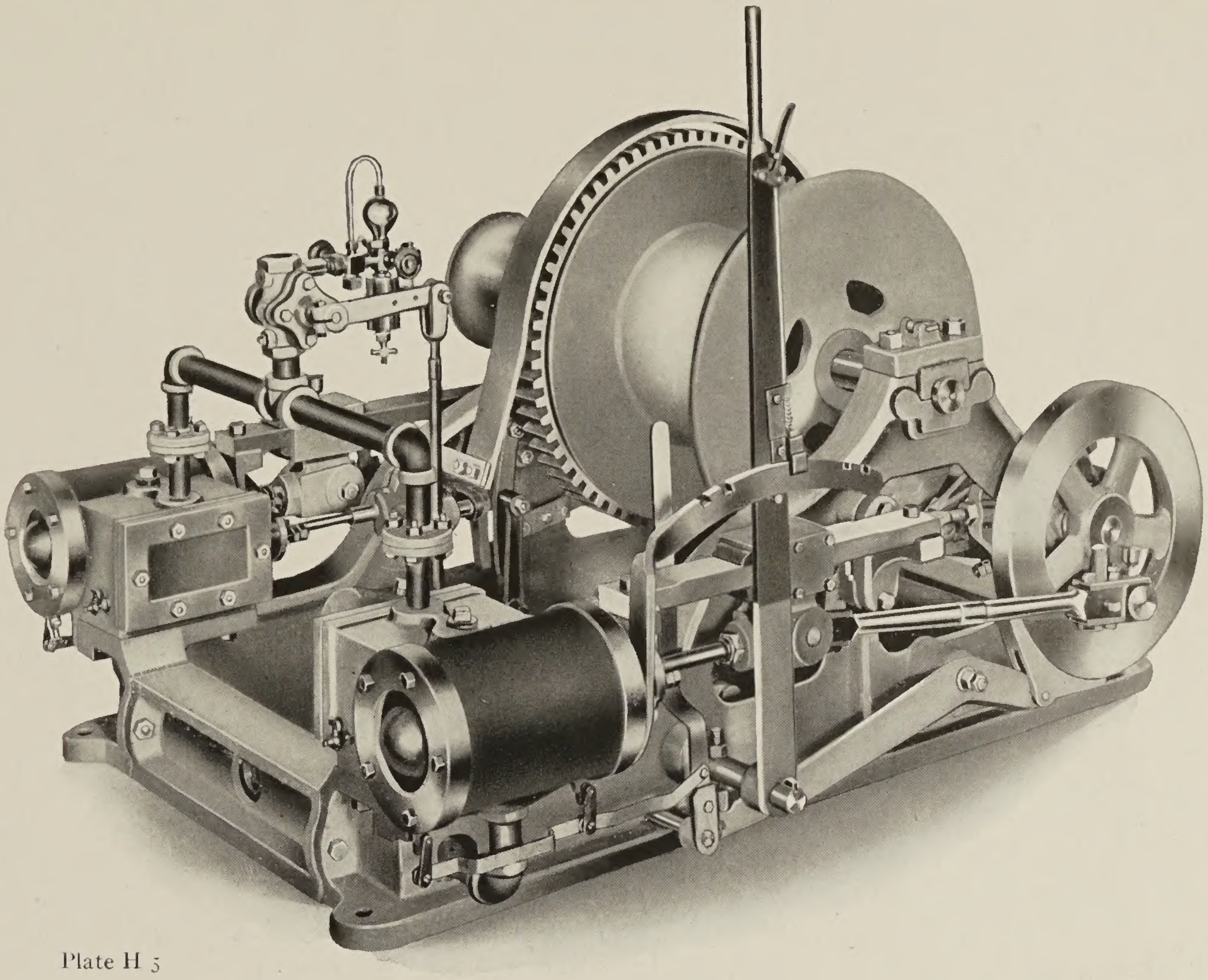


Plate H 5

Double Cylinder Reversible Link Motion Engine

Especially Adapted for Steam Lighters, Warehouses, Railroads, Tunnels, Docks, and for Small Mines and Inclines

THIS engine is particularly adapted for all hoisting purposes where it is necessary to have a compact and simple reversible engine which can be handled with ease, either at the engine or at a distance, by persons of ordinary intelligence. This quality is of special value in connection with steam lighters, as the engine can be placed below the deck and handled from the deck or pilot-house by means of rods, etc. The engine hoists, holds and lowers the load entirely by steam, and as the whole operation is performed by one lever it will readily be seen that any one, even an ordinary laborer, can handle it without difficulty. Our improved throttle valve connection insures a smooth and steady motion in starting, reversing and stopping, and renders the engine a great improvement over the usual type of reversible engine. This engine has a winch head on the end of the drum shaft. For **Small Mines** this style is exceedingly convenient, and will do a large amount of work in depths of from 50 to 200 feet or more. When used for mining purposes, we usually lag the drum about six inches larger in diameter than specified in the table, and can furnish our regular form of band foot brake instead of the automatic brake shown in the cut.

Table of Sizes, Etc.

Size Number of Engine	Horse-power Usually Rated	Dimensions of Cylinders		Weight Hoisted Single Rope Usual Speed Pounds	Dimensions of Hoisting Drum		Dimensions of Bed-plate		Estimated Shipping Weight Pounds
		Diameter Inches	Stroke Inches		Diameter Inches	Length Inches	Width Inches	Length Inches	
46	6	5	6	1500	10	12	34	44	1675
47	8	5	8	1800	14	14	36	57	2400
48	12	6¼	8	3000	14	15	39	59	2725
49	20	7	10	5000	14	19	44	70	3450
49¾	30	8¼	10	7000	14	20	47	72	4300
50	30	8¼	10	8000	16	26	54	72	5000
50¼	35	9	10	9000	16	26	54	73	5650
51	42	10	10	10500	16	24	59	75	7900
52	50	10	12	12000	16	24	62	88	9400
52¼	60	12	12	16000	18	29	65	89	11800

Single cylinder reversible link motion engines furnished of same sizes and at same prices as single cylinder friction drum engines shown on page 20.

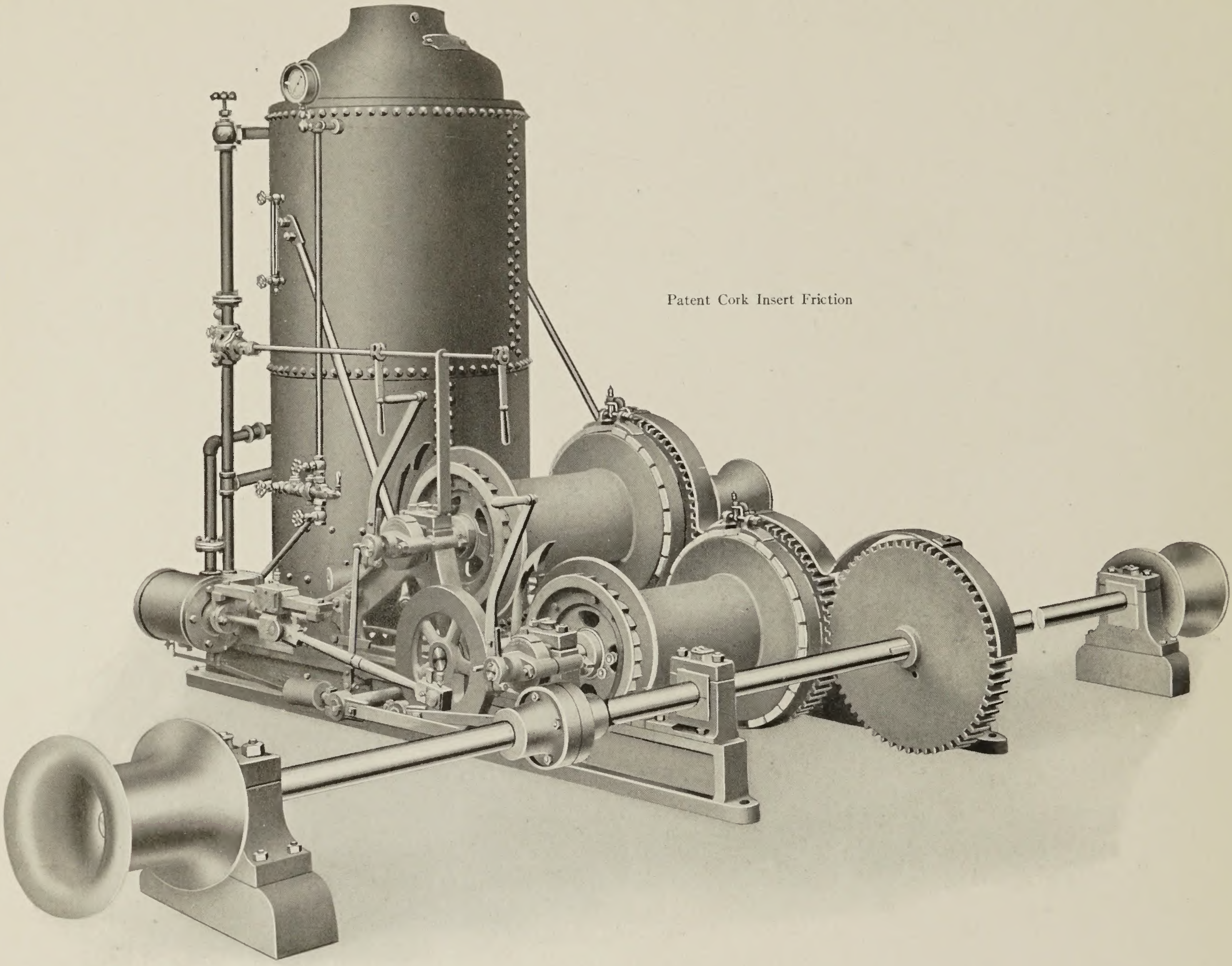


Plate H 163

Double Cylinder, Double Friction Drum Engine with Two Extra Winchheads on Extended Front Shaft

Especially Adapted for Pile-Driver Scows

ON Pile-Driver Scows the Hoisting Engine is usually entirely housed in and the front shaft for the extra winchheads is made long enough to reach clear across the house and leave the winchheads outside the housing on either side, where they are most handy for warping and other purposes. The illustration shows the simplest form of the extended front shaft with the winchheads and gear wheel keyed to the shaft. In this form the winchheads revolve all the time the engine is in operation. We build this type of engine with the gear wheel free upon the shaft and connected by a clutch and also with each winchhead independent, having its own clutch connection and pawl and ratchet.

AVERY CLASSICS

Two-platform Wheelbarrow Elevator Engine

With Friction Drum and Reversible Link Motion

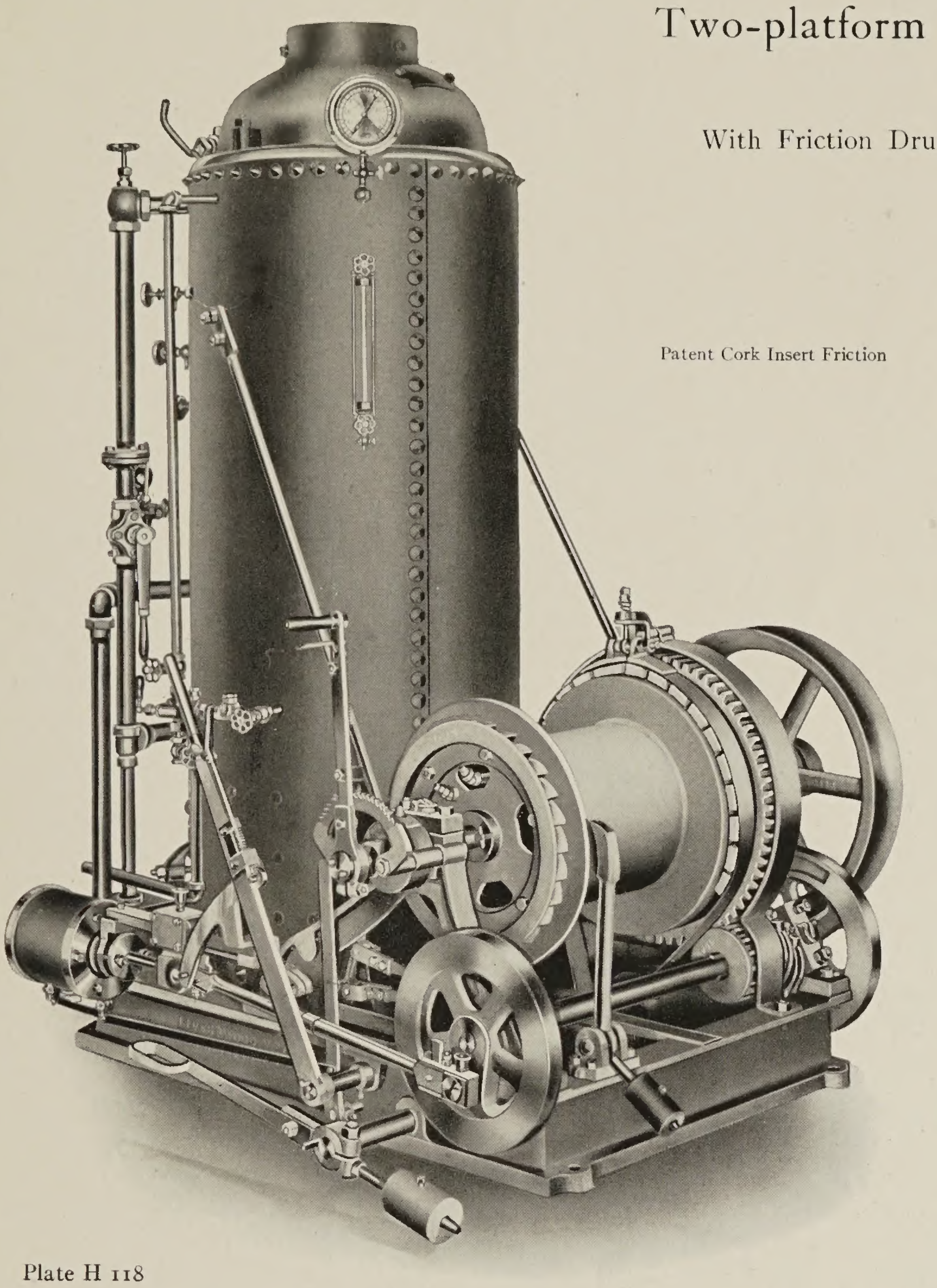


Plate H 118

THIS engine was especially designed for operating the regular form of double platform elevators for hoisting wheelbarrows or hods in buildings. It has double cylinders, with cranks connected at an angle of 90 degrees, so that it is always ready to start and stop and cannot get caught on centers. It has reversible link motion, and may be run in either direction by the simple changing of the position of the reverse lever, shown in an inclined position at the left of the engraving. This lever is arranged in a quadrant, so that it remains in whatever notch it is placed by the operator.

The drum is loose on the shaft and provided with the standard double cone wood friction, and is thrown into gear by means of the friction lever, which is also arranged to work on a toothed quadrant attached to the frame of the engine. The friction lever is provided with a thumb-latch and pawl engaging with the teeth of the quadrant, by means of which the friction lever is firmly locked in any desired position

These interlocking devices on the friction and reverse levers are of the greatest advantage in convenience of operation and the prevention of accidents.

The drum is also provided with a powerful differential band brake, operated by a foot lever, by means of which any load the engine will hoist can readily be held; or, if the load is to be held on the drum for any length of time, the drum ratchet and pawl may be used.

On the outer end of the drum shaft is placed the elevator sheave having a concave surface, around which the hod elevating rope may be passed several times in order to secure sufficient friction to operate the double cages. This sheave is of special shape to perform this duty and is arranged with a clutch on the drum shaft, by means of which it may be thrown out of gear whenever it is desired to use the engine for other purposes.

The drum is, of course, free to be employed for any of the hoisting purposes common to building operations.

In operating the hod elevator the drum is locked into the friction and the engine handled entirely with the throttle, reverse lever, and foot brake. The engine is very quick, and high speeds may be obtained in running the elevator.

Table of Sizes, Etc.

Size Number of Engine	Horse-power Usually Rated	Dimensions of Cylinders		Dimensions of Hoisting Drum		Diameter Tread of Sheave Wheel Inches	Weight Hoisted on Sheave Wheel Single Rope Pounds	Usual Speed Hoisted on Sheave Wheel Feet per Minute	Weight Hoisted on Drum Single Rope Pounds	Usual Speed Hoisted on Drum Feet per Minute	Dimensions of Boiler			Dimensions of Bed-plate		Estimated Shipping Weight Pounds
		Diam. Inches	Stroke Inches	Diam. Inches	Length Inches						Diam. Inches	Height Inches	Number of 2-inch Tubes	Width Inches	Length Inches	
280	6	5	6	14	16	24	600	350	1100	190	30	72	44	40	57	4425
281	8	5	8	16	20½	33½	800	500	1500	270	32	75	48	47	67	6100

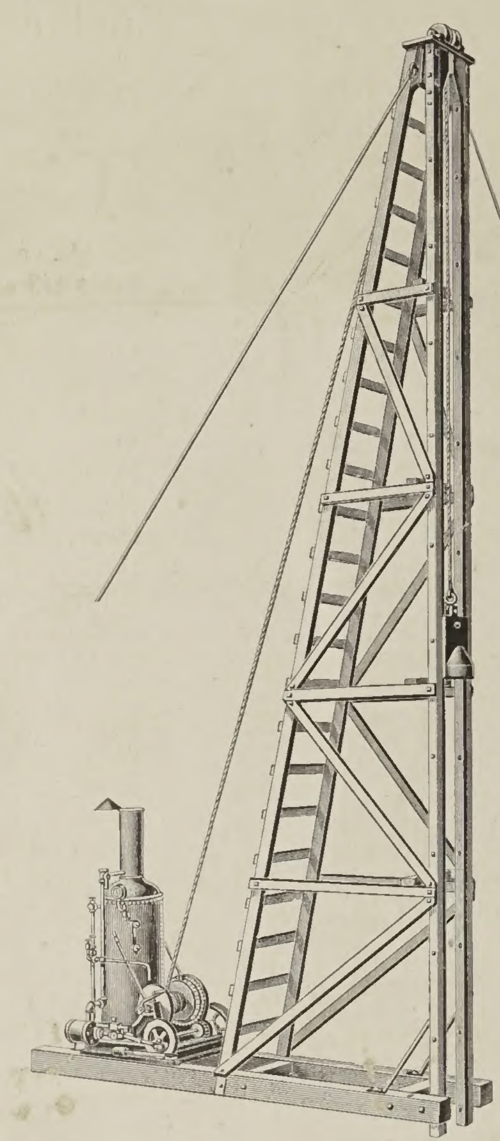


Plate H 35

Improved Pile Driving Derricks with Two Sheave Wheels

Complete, Ready for Use

THE above engraving represents our improved pile driving derrick, designed especially to meet the demand for a substantial and thoroughly well-made machine. These derricks are made in the best manner, of well-seasoned wood, which is fitted and bolted together securely. They can be taken apart for shipment and easily put together again.

Sizes

25-foot derrick . .	suitable for 1000- to 1200-pound hammer	45-foot derrick . .	suitable for 2500- to 3000-pound hammer
30-foot derrick . .	suitable for 1200- to 1500-pound hammer	50-foot derrick . .	suitable for 3000- to 3500-pound hammer
35-foot derrick . .	suitable for 1500- to 1800-pound hammer	55-foot derrick . .	suitable for 3000- to 4000-pound hammer
40-foot derrick . .	suitable for 1800- to 2500-pound hammer	60-foot derrick . .	suitable for 3500- to 5000-pound hammer

In ordering, specify the size of pile, diameter and length, for which derrick is intended. **Ironwork** complete for pile-driving. Frames made to order.

Pile Driving Hammers

We make all sizes of pile driving hammers to order, to suit the above derricks, of a superior quality of iron. Special sizes of derricks and hammers made to order.

Press of J. J. Little & Ives Co.
New York